

## On the Migration and Habits of the Norwegian Lemming.

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ALTHOUGH much has been written and constantly repeated, with reference to the habits and migrations of the Lemming, yet the obscurity which hangs alike over its permanent home and the motive of its journeys has never been completely dissipated; and I much fear that the present paper will rather suggest a new problem than prove a satisfactory solution of those already existing.

During ten consecutive summers spent in Norway I have three times lived literally in the midst of the lemmings, and have even, though involuntarily, shared my bed with them; thus I am enabled to speak positively, so far, at least, as my observation extends.

The species to which these remarks apply rejoices, unfortunately, in many an "alias;" but perhaps the name *Lemmus norvegicus*\* will best suit the present purpose, especially as the native name for the animal is "Lemander." This mouse, or rather vole, since it belongs to the Arvicolæ, resembles in colour and form a diminutive Guinea-pig, and is extremely variable in its size and markings. It has long attracted the notice of writers, both on account of its sudden appearance and its pugnacious and indomitable disposition; and the early description, "Victitat betulæ nanæ amentis, lichene rangiferino et aliis, mordax, sibilat, hieme sub nive currit, singulis circiter decem annis, insigni gelu præsertim imminente, universus animalium exercitus, autumnno, noctu præsertim linea recta migrat; pauca tamen in montes redeunt," has been usually followed and quoted, although, as will presently appear, it leaves much to be desired. Olaus Magnus thought that lemmings fell from the clouds, to which Ray rejoins, "mihi minime probatur;" adding that anatomical investigation had convinced him that "nature had not been such a niggard of her gifts as to render such a method of generation necessary."

Pennant † says that the Norwegian lemmings, which are larger than the Russian species, descend from the Kolen, marching in parallel lines 3 feet apart; they traverse Nordland and Finmark, cross lakes and rivers, and gnaw through hay- and corn-stacks

\* [Even more correctly *Myodes lemmus* (Linn.).—Ed.]

† Synop. of Quad. 1771, p. 271; Hist. Quad. 1793, p. 198.

rather than go round. They infect the ground, and the cattle perish which taste of the grass which they have touched: nothing stops them, neither fire, torrents, lakes, nor morasses. The greatest rock gives them but a slight check; they go round it, and then resume their march directly without the least division. If they meet a peasant, they persist in their course, and jump as high as his knees in defence of their progress. They are so fierce as to lay hold of a stick and suffer themselves to be swung about before they quit their hold. If struck, they turn about and bite, and will make a noise like a dog. Foxes, lynxes, and ermines follow them in great numbers; and at length they perish either through want of food or by destroying one another, or in some great water, or in the sea. They are the dread of the country; and in former times spiritual weapons were exerted against them: the priest exorcised them, and had a long form of prayer to arrest the evil. Happily it does not occur frequently, once or twice in twenty years. It seems like a vast colony of emigrants from a nation overstocked—a discharge of animals from the northern hive which once poured out its myriads of human beings upon Southern Europe. They do not form any magazine for winter provision; by which improvidence, it seems, they are compelled to make their summer migrations in certain years, urged by hunger. They are not poisonous, as vulgarly reported; for they are often eaten by the Laplanders, who compare their flesh to that of squirrels.

Here I must enter a protest; for having tasted many animals, I should prefer even the “cold missionary” of Sydney Smith to a lemming ragout. However, tastes differ. I once made a savoury mess of stewed ermines, and invited my Norwegian guide and friend to partake of it. He gently and politely said, “I *have* breakfasted,” but immediately walked out and returned without that most necessary meal.

Prof. Newton\*, writing on the migration of birds, distinguishes as “partial migrants” such species as the woodcock, of which only the *majority* of individuals migrate. The lemmings must belong to this class, since although none of their wandering hosts return, it must be assumed, even if it be difficult of proof, that some remain at home to supply material for future emigrants. While a deficiency of food explains the departure, it does not, as Prof. Newton rightly remarks, account for the return of those birds

\* Encycl. Brit. 9th ed. (1875) vol. iii. p. 765.

which migrate south. There is, however, in birds, and, I believe in fish, a very strong affection for their old nests and breeding-places generally, which cannot exist in the lemmings, since they breed *en route*.

M. Guyon\*, writing in 1863, disposes of the theory that these migrations are influenced by *approaching* severe weather, since the one witnessed by himself took place in the spring; also the superabundance of food during the previous autumn seemed evidence against the theory of starvation. He therefore adopts a third view, that excessive multiplication in certain years necessitates emigration, and that this follows a descending course like the mountain-streams, till at length the ocean is reached.

It is, however, very remarkable that no one professes to have seen the lemming at home; and as he is not shy, the broad fjelds of Norway are as conspicuous by his absence as by his too demonstrative presence.

I well remember, in the autumn of 1867, when I happened to be shooting at an elevation of about 4000 feet, that my attention was suddenly drawn to a shrill note, which I imagined to be produced by some bird unknown to me, till my Norsk companion told me it was the cry of a Lemander or lemming.

I had not long to search for the musician. He had set his back against a stone, and, repeatedly jerking his body up and down as though intending to jump at me, kept uttering the quick shrill yelp which first drew my attention. I made a hasty snatch at the pretty animal, whose black bead-like eyes protruded with rage. He also made a snatch; and his snatch proved the more successful of the two, as his incisor teeth left their pattern on my hand for some days afterwards.

My companion was no friend to the lemmings, and was loud in his prophecies as to a severe winter and diminished grass to follow in the spring. However, "one swallow does not make a summer," and it was some weeks before I saw another lemming; then, on lifting a large flat stone, I found six in a snug nest, apparently recently born. In a few days the whole fjeld became swarming with these pretty voles. My dogs waged incessant war upon them, although they never eat them; and I noticed that several species of hawks became unusually plentiful.

As the season advanced and snow covered the ground, footprints showed how foxes had joined in the pursuit, whose tracks were

\* Comptes Rendus, 1863, p. 486; and Ann. & Mag. N. H. 3rd ser. xii. p. 407.

studded with dead lemmings, which they had killed but not eaten, probably having plenty of more delicate food. In the higher fjelds I noticed that the Reindeer had often killed the lemmings, apparently by stamping upon them, though I do not believe their bodies are ever eaten.

It was a curious sight, when the whole visible landscape was of a spotless whiteness, to see an apparently black form suddenly spring from the surface and scurry over the snow and again vanish. I found some of the holes where this feat was executed were at least 5 feet in depth; and when the snows of eight months had melted beneath perpetual daylight and almost perpetual sunshine, it became easy to trace the long lines formed in the grass by these improvident excursionists. I use the word improvident, because no stores were accumulated by them as by the common field-mouse; but yet this probably only necessitated foraging excursions whilst their congeners were lazily sleeping.

In this country we fail to conceive how much active life goes on beneath the snow; but in northern latitudes its warm protection serves as a roof to numerous birds, quadrupeds, and insects, who are thus enabled to find an otherwise impossible sustenance. It is only at the commencement of the winter that the footprints on the snow tell of the ceaseless struggles and surprises which render the long autumnal nights so fatal to all but predaceous animals.

It does not appear that the migration of the lemmings is ever completed in one year. In this case, and in all the others that I have noticed or heard of, the animals came during the summer. There was no "procession," no serried bands undeterred by obstacles; but there was a continuous invasion of temporary settlers, which reared their young two or three times in the summer, and, with reinforced numbers, spread even further westward. They certainly did not mine through hay- and corn-stacks, as those familiar objects are all but unknown in Norway.

On calm mornings my lake, which is a mile in width, was often thickly studded with swimming lemmings, every head pointing westward; but I observed that when the boat came near enough to frighten them, they would lose all idea of direction, and frequently swim back to the bank they had left. When the least wind ruffled the water, it was all over with the swimmers; and never did a frailer bark tempt a more treacherous sea, as the wind swept daily down the valley and wrecked all who were then afloat.

It was impossible not to feel pity for these self-haunted fugitives. A mere cloud rapidly passing over the sun affrighted them ; the approach of horse, cow, dog, or man alike roused their impotent anger ; and their little bodies were convulsively pressed against the never-failing stone of vantage whilst they uttered cries of rage. I collected five hundred skins with the idea of making a rug, but was surprised to find that a portion of the rump was nearly always denuded of hair ; and it was long before I discovered that this was caused by that habit of nervously backing up against a stone, to which I have already alluded. As this action is excited by so slight and constant a matter as the passage of the shadow of a cloud, I confess I am surprised not to find a natural callosity rather than so constant a lesion ; and this is a point which seems of some little importance in connexion with the whole subject of undoubtedly inherited tendencies, of which migration is an example.

Mr. Wallace \* suggests that "the survival of the fittest" has played an important part in causing migration by giving an advantage to those animals which enlarge their breeding-area by travel. The lemming, it is true, always breeds during migration ; but if none return or survive, it is difficult to say what becomes of the fittest. However, I shall shortly have to mention a theory which may tide over the difficulty.

The lemmings certainly do not visit my part of Norway at any recurring period of years ; but every third or fourth year they may be expected with tolerable regularity, though in variable numbers. Thus it is quite probable that some migrations may have so far escaped notice as to give rise to the old idea that they took place every tenth year.

They are, however, always directed westwards ; and thus the theory that they are caused by deficiency of food fails so far, that these migrations do not take place in a southerly direction, by which a larger supply might be obtained. M. Guyon (*l. c.*) suggested that the course followed was merely that of the watershed. However, this runs east as well as west, and follows valleys which often run north and south for hundreds of miles, whereas the route pursued by the Lemming is due west. At all events this is the case in Norway, where they traverse the broadest lakes filled with water at an extremely low temperature, and cross alike the most rapid torrents and the deepest valleys.

With no guiding pillar of fire, they pass through a wilderness by night ; they rear their families on their journey ; and the three

\* Nature, 1874, vol. x. p. 459.

or four generations of a brief subarctic summer serve to swell the pilgrim caravan. They winter beneath more than 6 feet of snow during seven or eight weary months; and with the first days of summer (for in these regions there is no spring) the migration is renewed. At length the harassed crowd, thinned by the unceasing attacks of the wolf, the fox, the dog, and even the reindeer, pursued by eagle, hawk, and owl, and never spared by man himself, yet still a vast multitude, plunges into the Atlantic Ocean on the first calm day, and perishes with its front still pointing westward. No faint heart lingers on the way; and no survivor returns to the mountains. Mr. R. Collett, a Norwegian naturalist, writes that in Nov. 1868 (quoted by Lilljeborg *infra*) a ship sailed for 15 hours through a swarm of Lemmings, which extended as far over the Trondhjemsfiord as the eye could reach.

In this remarkable migration it is not perhaps the power of direction evinced which is most striking. Domesticated animals, and even men in a savage state, have often distinctly manifested this faculty, which, to whatever it may be owing, is certainly not explicable by any "known sense or power of judgment."

Herr Palmén\*, indeed, says "experience guides migration," and the older migrants guide the younger, like one of Mr. Cook's "personally conducted tours." This cannot be true of the lemmings. I may briefly mention that a young dog which I took from England, and then from my home in Vaage Valley by a path to Heindaken, a distance of forty-six miles, ran back the next morning by a direct route of his own, crossing three rapid rivers and much snow, and accomplishing the distance in less than six hours without the vestige of a path. This same dog afterwards repeated the feat, but followed the path, and took two days in reaching his destination, hindered and not aided, as I believe, by his experience. But to return to the lemmings—it seems almost impossible that a so-called instinct, even if this could be shown to be independent of inherited experimental experience, would so totally and persistently fail in its only rational purpose. If insufficiency of food be alleged as the *present* cause of these migrations, the question at once arises, why do not settlers make a permanent home in the many oases through which they pass? Why, in fact, do they migrate westward and not southward? and why do they not return? The Swallows and all our familiar migratory birds seek

\* Om Foglarnes flyttningsvägr (Helsingfors, 1874), an abstract of whose views is given by Prof. Newton, *op. cit.*

a more genial climate and more abundant food, but return to us as surely as summer itself; nor do they ever, so far as I know, breed during their passage. Even the Locusts present no such problem as the lemmings, since it is generally the wind rather than any migratory instinct which brings their dreaded hosts to the shores of Europe. Perhaps the most noticeable parallel is afforded by the migration of Pallas's Sand-grouse in 1863\*, when a species, whose home is in the Tartar steppes, journeyed in considerable numbers to the most western shores of Europe, and very probably many individuals perished, like the lemmings, in the waves of the Atlantic.

There is, however, a solution of this difficulty, involving a subject that has always seemed to me of the deepest interest, and which led me to spend two years among the Canaries and adjacent islands. I allude to the island or continent of Atlantis.

Now without going so far as to assert that the Canary and other Atlantic groups are but the uppled volcanic summits of a submerged land, it yet is evident that land did exist in the North Atlantic Ocean at no very distant date; and the depth of water on the so-called telegraph-plateau disposes of one of the difficulties felt by many with regard to more southern latitudes. Is it not then conceivable, and even probable, that when a great part of Europe was submerged and dry land connected Norway with Greenland, the Lemmings acquired the habit of migrating westward for the same reasons which govern more familiar migrations?

To make this clearer, let me put a hypothetical case. Suppose the Swallows were partial migrants from Great Britain, and suppose that Africa were to become submerged, would not many generations of Swallows still follow their inherited migratory instincts, and seek the land of their ancestors through the new waste of waters? whilst the remaining stock, unimpeded by competition, would soon recruit the ranks for a new exodus. It appears quite as likely that the impetus of migration towards this continent should be retained as that a dog should turn round before lying down on a rug, merely because his ancestors found it necessary thus to hollow out a couch in the long grass.

Influenced, I feel bound to admit, by this idea, I should willingly have found lemmings in Iceland; but the only indigenous mammal there, I believe, is the *Mus islandicus* (? *sylva-*

\* *Vide* 'Ibis,' 1864, pp. 185-222.

*ticus*). I presume Mr. Andrew Murray\* had been misled by insufficient description to suppose that this was a lemming from the American continent, from which he would have derived the comparatively recent connexion of Iceland and America. Indeed Steenstrup has shown that this theory, so far as it was supported by the identity of species, was quite untenable. In the absence of living specimens, I turned to fossil remains; but the so-called lemming of Brixham cave is stated to be *Lagomys spelæus*, which is more nearly allied to the hares. However, Professor Owen found a *Georychus*, which probably is the Siberian lemming, in company with remains of *Elephas primigenius* in lacustrine brick-earth near Salisbury. I am therefore inclined to assume that in former days the lemming had a climatal motive for its migrations; and it may even be supposed that some, at least, returned to their northern home; otherwise it seems hard to account for the persistency with which they cling to a suicidal routine.

One more point occurs to me before I conclude; and that is that I have been quite unable, although living very high up in the fjeld, to obtain any lemmings during the intervals of migration; nor can I throw any satisfactory light on their home, if it can be called by that name. Prof. Lilljeborg states† (as most Norwegians believe, but few or none have verified) that the lemming has its head quarters on the higher fjelds.

Finally, I feel that, whilst thus claiming this birthright of inherited tendencies for the lemming, I may be asked, "Why, then, has the singular fact of the raw and denuded back produced no inherited modification in the present race, since it is presumable that their enemies are not creations of yesterday?" Well, that I cannot answer; and one of my chief reasons for publishing this paper has been the hope that some one may be able to throw more light on the subject.

\* Geograph. Distrib. of Mam. (1866) p. 26.

† Sveriges och Norges Ryggradsdjur, (1874) p. 374.